REMARKS

Claims 1-23 are pending in the application, with claims 9-23 withdrawn from consideration. All of examined claims 1-8 have been rejected.

Claim Rejections - 35 U.S.C § 112

Claim 1-8 have been rejected under 35 U.S.C 112, first paragraph, as failing to comply with the enablement requirement. More specifically, it is the Examiner's position that the specification fails to enable one to practice the invention including "a protective structure that detects the rise in the current flow." The Examiner states that "It is not clear how [*sic*] a protective structure looks like; where a protective structure is located and how a protective structure work [*sic*] to detect the rise in the current flow?"

We strongly disagree with the Examiner's position. The specification clearly teaches the protective structure in numerous paragraphs.

The protective structure is first introduced in paragraphs 6 and 7:

> [0006] An object of the present invention is to specify an IC chip having a protective structure, which is sufficiently effective against external irradiation and, in particular, also protects against focused radiation.
>
> [0007] The IC chip according to the invention indicates possibilities regarding the manner in which the protective structure is distributed over the semiconductor chip in such a way that it is not possible, by means of irradiation, to trigger a malfunction in a region of the integrated circuit without the protective structure also being affected by the irradiation in a detectable manner.

A first embodiment of the protective structure is discussed, for example, in paragraphs 8 and 9:

> [0008] A first of these possibilities, ... provides for at least one electrical conductor (which is present in the integrated circuit) or at least one electrically conductive connection to be provided, in a redundant manner,

with a further electrical conductor or with an identical connection, which is respectively in the form of a doped region in the semiconductor material. The effect achieved by this is that any external electromagnetic or radioactive irradiation affecting an electrical conductor of the integrated circuit also affects the associated doped region and generates free charge carriers there which give rise to a flow of current during operation of the circuit. This flow of current may be detected by a connected circuit.

[0009] ... The doped regions may be aligned under the data line, in particular the bit lines. Since the data lines form a dense grid on the top side of the IC chip, any irradiation will generate charge carriers at least in one doped region running parallel to these data lines, the charge carriers resulting in an unusually high flow of current in the data line in question. External irradiation at an arbitrary location on the top side of the IC chip may be detected in this manner.

This first embodiment is then further discussed, for example, in paragraph 21:

[0021] ... Strip-type doped regions 3 which are arranged parallel to the conductors 2 are situated under the latter in the semiconductor material. ... If an electric current flows in the conductors 2, the current intensity is increased, in the event of external irradiation, by the free charge carriers occurring in the doped regions 3. This increased current intensity may be detected and is an indication of the fact that the functioning of the circuit is changed by external irradiation.

A second embodiment of the protective structure is discussed, for example, in paragraphs 10 and 11:

[0010] An alternative protection mechanism for an IC chip provided with a memory, in particular with an EEPROM, uses the transmission of additional data (which is carried out anyway) as check digits or a code number in order to detect external irradiation. That is to say, when reading memory cells, redundant bits are concomitantly transmitted for the purpose of error correction. This additional information is used to check whether the data transmitted on the data lines are corrupted.

[0011] The further data lines for these check digits or code numbers are arranged between the data lines which are intended for transmitting the actual information. ...

This second embodiment is then further discussed, for example, in paragraph 23:

[0023] FIG. 2 illustrates the arrangement of data lines and further data lines of an IC memory chip 10. ... The test lines PL0, PL1, PL2 and PL3 are arranged between the bit lines in such a manner that it is not possible, or it is at best possible with considerable outlay, to change the data transmitted on the bit lines without also changing the further data on the test lines. Any change to the data by external electromagnetic or radioactive irradiation thus leads to the situation where the (randomly changed) check bits, check digits or code numbers for data correction which have actually been transmitted allow the conclusion to be drawn of a change in the (randomly changed) information transmitted on the data lines which is so considerable that an attempt at manipulation by external irradiation may be assumed and appropriate countermeasures may possibly be initiated.

A third embodiment of the protective structure is discussed, for example, in paragraph 13:

[0013] A further exemplary embodiment provides for a shield, which is present on the chip anyway and is formed from patterned electrical conductors, to be modified to the effect that external electromagnetic or radioactive irradiation may be detected. The shield is usually present in a topmost metallization plane of the chip. ...

This third embodiment is then further discussed, for example, in paragraphs 24 and 25:

[0024] FIG. 3 illustrates a diagrammatic cross section of a further exemplary embodiment, in which the IC chip is provided on the top side with a conductor structure having radiation-dependent electrical resistance. ... Conductors 4, 5 (between which a dielectric material is arranged as connection 6) are present here on the top side of the substrate, in particular on the top side of the metallization planes and intermetal dielectrics (arranged above the actual semiconductor body) for the electrical interconnection. In one preferred refinement, the material is selected in such a manner that its relative permittivity changes in the event of external electromagnetic or radioactive irradiation or its electrical resistance decreases in the event of irradiation of this type. The conductors 4, 5 may, in particular, be parts of a patterned shield.

[0025] In the event of external irradiation, it is possible to detect the accompanying change in capacitance between the electrical conductors 4, 5

and/or an increase in the electrical conductivity of the connection 6 present between the latter. ...

A fourth embodiment of the protective structure is discussed, for example, in paragraph 15:

> [0015] A further possibility is to provide a material between the electrical conductors, the electrical resistance of the material, in the event of external irradiation, decreasing in such a manner that a certain electrical conductivity between two electrical conductors (insulated from one another beforehand) can be detected through this material or a conductive connection, a short circuit in the extreme case, is even produced between the conductors.

This fourth embodiment is then further discussed, for example, in paragraph 22:

> [0022] ... A spacing may be present between the conductors 2 and the doped regions 3, ... The doped regions 3 may also be laterally offset with respect to the conductors, with the result that, in the example illustrated in FIG. 1, the doped regions may also be arranged between the regions of the substrate which are provided with the conductors 2. The doped regions 3 do not need to be present over the entire length of the conductors 2. ...

Thus, the specification more than adequately enables one of ordinary skill in the art to make and/or use the invention. That is, the specification adequately explains what the protective structure looks like, where the structure is located, and how the structure detects the rise in the current flow. Reconsideration and withdrawal of this rejection is respectfully requested.

Drawings

The drawings have been objected to as not showing the "protective structure" recited in claim 1. Applicant respectfully disagrees with the Examiner's position. As discussed above for the nonenablement rejection, the drawings clearly show the protective structure. More specifically, in the embodiment shown in Figure 1, the protective structure is shown as the doped regions 3. In the embodiment shown in Figure 2, the protective structure is shown as the test lines PL0, PL1, PL2, and PL3. In the embodiment shown in Figure 3, the protective structure is shown as the electrical conductors 4, 5. Applicant therefore respectfully requests the Examiner to reconsider and withdraw this objection.

Claim Rejections - 35 U.S.C 102

Claims 1-8 have been rejected under 35 U.S.C 102(e) as being anticipated by Bretschneider et al. (U.S. Patent Publication No. 2002/0130248).

Bretschneider is not prior art with respect to the present application. Applicants claim priority of the present application to German Application No. 101 40 045.4, which was filed on August 16, 2001. Bretschneider was filed in the U.S. Patent Office on January 17, 2002, more than five months after Applicant's priority date. Applicant submits herewith a certified translation of the German priority document. Withdrawal of this rejection is therefore respectfully requested.

In view of the above amendment, applicant believes the pending application is in condition for allowance.

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Respectfully submitted,

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